

## **1.0 INTRODUCTION**

Safety auditing of existing roads provides a method of undertaking a peer review of safety features on an existing road network. This report provides a summary of the main findings of the 11 safety audits of existing roads commissioned in 1997 and 1998 in New Zealand.

As safety audits of existing roads are undertaken as a one-on-one exchange between the auditee (RCA) and the auditor (Transfund Team), it is intended that this report will provide a means of informing the profession as a whole of the results of the safety audits.

## **1.1 BACKGROUND**

Safety auditing of existing roads has developed over the last four years. Draft safety audit procedures were developed for Transit New Zealand in February 1996 ("Safety Audit Procedures for Existing Roads"). These procedures were then revised for Transfund in April 1998 and tested against the 1998 safety audits. This led to Transfund making the final document standard in December 1998 (Report No. RA97/623S).

Ten of the safety audits undertaken in 1997/98 were carried out using the 'Safety Audit Procedures for Existing Roads' (February 1996), while the most recent audit was carried out in accordance with the April 1998 revision of the procedures.

## **1.2 AUDIT PROCESS**

Safety audits of existing roads are undertaken over a representative sample of urban and rural roads within a RCA by an independent audit team. A representative from the RCA is present throughout the duration of the audits. The audits are carried out over a three day period and include both daytime and night-time inspections.

The team identifies common features and makes general recommendations. These recommendations are aimed at improving existing policies and developing new policies to deal with the deficiencies, rather than identify specific problems that need addressing. A risk code of either urgent, high, medium or low is assigned to each deficiency to provide some initial guidance for prioritising feasibility investigations into each item identified. A report is produced for the RCA outlining the general features and recommendations which were made, with details of the routes audited provided in the appendices.

In many instances the RCA representatives draw to the attention of the Audit Team possible deficiencies, and inform the team of policies and programmes which are in place to deal with them. As a result of the safety audits, some RCAs have put in place programmes to address deficiencies which were previously overlooked by the RCA.

## Summary Report of Safety Audits of Existing Roads Undertaken in 1997 & 1998 2

Safety audits of existing roads now identify safety provisions which are of a consistent and high standard, however, this report only details the deficiencies which were noted in the safety audit reports.

In addition to identifying safety deficiencies, issues relating to national standards and guidelines are noted. These issues are not matters that the individual RCAs can address, and are referred to the appropriate "Authorities".

## **2.0 SUMMARY OF MAIN FINDINGS**

From the 11 safety audits of existing roads undertaken during 1997/98 the following number of recommendations were identified:

Authority	Road Environment	Number of Recommendations	
		Urban	Rural
1	Rural	0	27
2	Mostly Urban	32	0
3	Mostly Rural	0	16
4	Mostly Rural	11	4
5	Urban	18	0
6	Mostly Urban	10	1
7	Urban	12	0
8	Urban & Rural	6	14
9	Urban & Rural	15	11
10	Urban & Rural	10	8
11	Mostly Rural	3	16
		117	97

From these recommendations the common themes have been extracted and are outlined below.

## **2.1 RURAL ROAD SAFETY AUDITS**

### **2.1.1 SIGNS**

- **Curve Warning Signs**

The inconsistent application of curve warning signs is a common theme throughout most of the 1997/98 safety audits of existing roads. Inconsistencies were noted particularly in regard to the location of, size of, and advisory speed values on curve warning signs. In many instances curve warning signs were erected too close to curves, and were not in accordance with MOTSAM. Refer to Photograph A1.

Another recurrent problem was the non-existence of or incorrect speed value on supplementary advisory speed plates. At many curves which had a significantly

lower design speed than the surrounding speed environment a curve warning sign was installed without an advisory speed plate. In addition, a large number of the posted advisory speed values were higher than the speed at which the curve could be comfortably negotiated. This, combined with other curves which could be negotiated at speeds significantly higher than the posted advisory speed value, led to the application of advisory speed values providing an inconsistent message to motorists.

- **Chevron Sight Boards and Curve Indicator Boards**

The application of CSBs and CIBs was noted as inconsistent in the majority of the 1997/98 safety audits. Common issues included poorly located CSBs (e.g. not in line with the centre of the approaching traffic lane - refer to Photograph A2), and the use of variable sizes and a mixture of colours. There were also situations where a CSB / CIBs should have been erected but were not. In addition, many curves were delineated by a CSB but no advanced warning in the form of a curve warning sign was provided to approaching motorists as is required by MOTSAM.

MOTSAM states that CSBs should be used with discretion, and should be erected at those curves where a curve warning sign and supplementary advisory speed value are erected on the approaches, and speeds through the curves are consistently greater than the posted advisory speed or a significant crash record exists.

## **2.1.2 DELINEATION**

- **Edge Marker Posts**

The provision of EMPs is inconsistent with varying levels of use. Many older installations are still in place, providing a poor standard of curve delineation, while upgraded installations have recently been installed providing a very high standard. This has resulted in several high volume roads with a very poor standard of EMP delineation, whilst other low volume roads have a very high standard (sometimes too high) of EMP use. The overall effect is an inconsistent level of delineation throughout RCA's.

The non-standard use of EMPs to mark roadside hazards instead of hazard markers was also noted in many situations.

- **Bridge End Marker Posts**

There were many situations where the installation of BEMPs to delineate bridge ends and/or bridge piers was either non-existent or ineffective. Missing BEMPs were often noted, and poor positioning was common place where BEMPs were mounted too far from the concrete kerb or other physical restriction (refer to Photograph A3). Night-time surveys revealed numerous ineffective installations.

## **2.1.3 ROADSIDE HAZARDS**

The existence of hazards at or near the roadside was observed in the majority of the 1997/98 safety audits. Common hazards included rural letter boxes, power poles, fence posts, open drains, non-frangible signs, and unprotected bridge ends. In many situations

the hazards are located directly adjacent to the shoulder and are therefore a considerable safety risk to errant vehicles. Refer to Photograph A4.

#### **2.1.4 INTERSECTIONS**

- **Form**

Several poor intersection layouts were noted during the 1997/98 safety audits of existing roads. These included very wide intersections with poor channelisation of traffic, to Y-type intersections with a very low angle of entry (refer to Photograph A5). The location of intersections on the inside of curves was also noted in the rural road environment, where approach speeds are high and sight distances are limited.

- **Conspicuity**

The conspicuity of several intersections was poor due to the lack of delineation and/or appropriate signage. Poor delineation was observed at intersections located on the inside of curves, where continuity lines and/or red RRPMs were not installed. Inconsistent treatment was noted on the minor road approach to T-intersections with poor backgrounds. Some intersections were delineated using a diverge CSB (refer to Photograph A6), and other similar intersections were not delineated at all.

- **Control**

The lack of intersection control was a common theme in the 1997/98 safety audits. Many intersections were uncontrolled while similar intersections were controlled. A large number of controlled intersections had an inappropriate control (i.e. a Stop control installed where a Give Way control would be more appropriate). In general, the application of rural intersection control was inconsistent.

#### **2.1.5 MAINTENANCE**

- **Shoulder Condition**

Many rural road shoulders were in poor condition due to low levels of edge break maintenance and vegetation control. Edge break in many locations was close to the edge line, and there were other locations where grass and weeds were growing against the edge of the seal which restricted drainage.

- **Edge Marker Posts**

Poor levels of EMP maintenance were noted in several of the 1997/98 safety audits. This mainly included the non-replacement of damaged and/or missing EMPs. This was particularly noted during night-time surveys when "holes" appeared in the road delineation where EMP maintenance was lacking.

- **Detritus**

There were areas of detritus noted adjacent to road intersections and private accessways. This was mainly caused by the migration of loose chip from unsealed roads/driveways, and high levels of edge break.

### **2.2.7 INTERSECTIONS**

- **Traffic Signals**

There is a mixture of traffic signal layouts in operation within RCA areas, presenting drivers with varying conditions from one signalised intersection to another. The differing layouts may catch some drivers unawares, with an increased likelihood of crash occurrence. All of the safety audits which noted this problem recommended signal upgrades to Austroad standards, to provide consistency for motorists.

- **Roundabouts**

The standard of delineation/warning signs on smaller roundabouts is inconsistent within RCAs. Some small roundabouts have RG-17 (Keep Left) signs to indicate the presence of the roundabout and the direction of flow, others have single chevron curve indicator boards, and some have no signs at all. Refer to Photographs B6 and B7.

### **2.2.8 PEDESTRIAN CROSSING FACILITIES**

During the 1997/98 safety audits varying standards of pedestrian crossing facilities were noted. This included the poor standard of warning signs on the approaches to some zebra crossings, crossings greater than 10m in length, and a poor standard of kerb extensions. These deficiencies create inconspicuous pedestrian crossings and an inconsistent national standard.

In addition, there was an inconsistent standard of layout for pedestrian crossing points, including step down kerbs on opposite sides of a road which do not line up, throat islands which do not have a gap for pedestrians (when the road kerbs either side do), a lack of crossing points, and inconspicuous refuge islands.

### **2.2.9 LIGHTING**

An inconsistent standard of urban lighting, particularly on arterial routes, was noted by the safety audits. Several major routes had substandard illumination levels, whilst other routes had a mixture of lighting installation types, resulting in a non-uniform level of lighting along a route. There were also several instances where the lighting of traffic islands was below standard.

There is concern over the standard of lighting at urban fringe areas, where the use of EMPs from the rural speed environment is terminated, and lighting installations are poor or non-existent. This often occurs in 70 km/h buffer zones.

### **2.2.10 MAINTENANCE**

- **Vegetation**

There were numerous situations noted within the urban environment with poor vegetation control, leading to many signs being obscured to approaching motorists. There are a number of intersections where inappropriate vegetation in traffic islands

is restricting sight distance for turning traffic and to traffic control devices (i.e. traffic signal aspects, RG-5 "Stop" signs). Refer to Photograph B8.

### **3.0 CONCLUSIONS**

Based on the results of the 11 existing road safety audits undertaken in 1997/98, there have been a number of issues noted relating to the inconsistent application of standards and guidelines on both urban roads and rural roads. It should be noted that some RCAs have already identified deficiencies themselves and have programmes in place to address them, whilst other RCAs have moved to implement the recommendations made in the safety audit reports.

As well as safety deficiencies, the safety audits now identify features which have a consistent and high standard, however, these were not covered in this summary report.

In summary, there is considerable variation in the application of standards and guidelines throughout the country. This results in an inconsistent "picture" to road users as they travel from one area to another, where there should be a predictable "no surprises" environment.